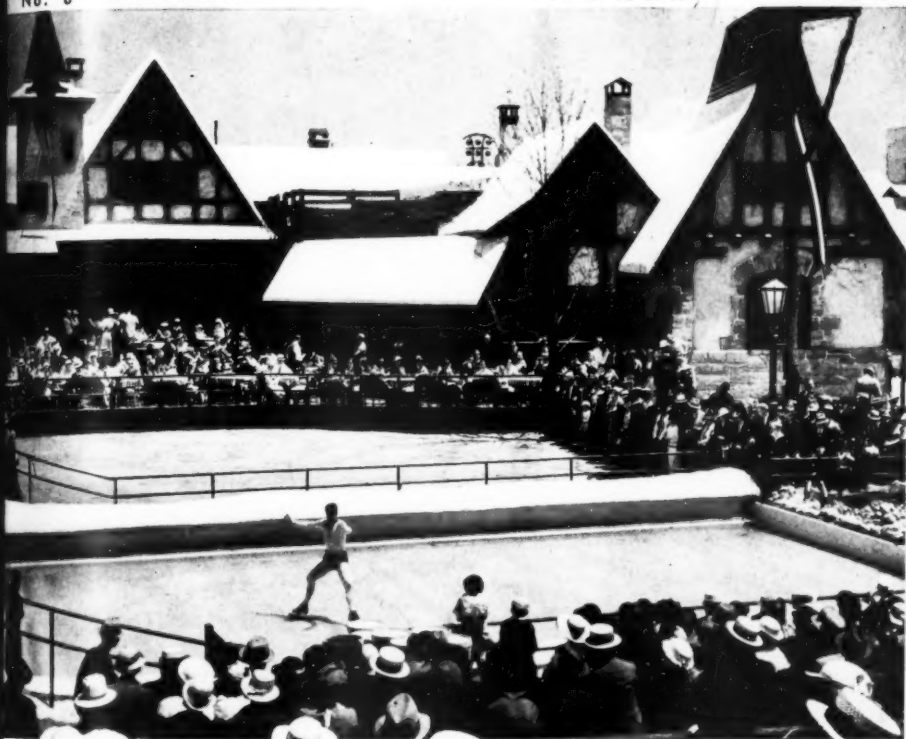


The ⁶² Refrigeration Service Engineer

Vol. 2
No. 8

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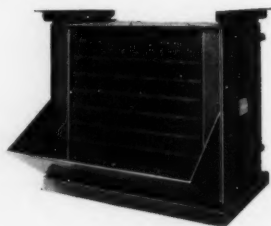
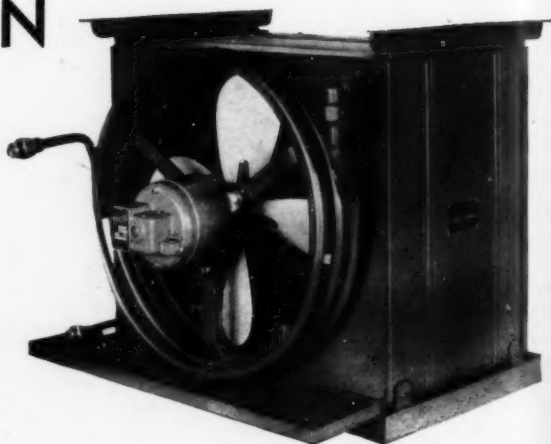
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Devoted to the Servicing of
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VOL. 2

AUGUST, 1934

NO. 8

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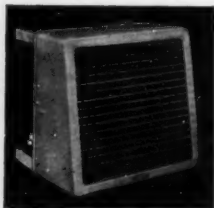
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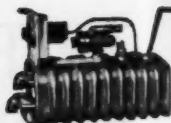
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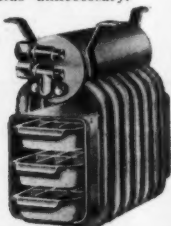


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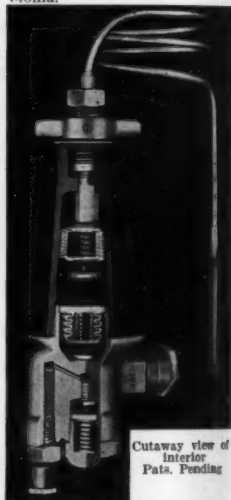


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The Refrigeration Service Engineer



A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

OFFICIAL ORGAN REFRIGERATION SERVICE ENGINEERS' SOCIETY

VOL. 2, No. 8

CHICAGO, AUGUST, 1934

\$2.00 per Annum

The Zerozone Compressor

General Construction Features of Compressor. Description and Illustrations of Various Parts. Compressor Specifications.

THE Zerozone Compressor, a single and two-cylinder job formerly manufactured by the Zerozone Corporation of Chicago, is of the conventional reciprocating type, V-belt drive. A general diagram showing the complete refrigeration cycle is shown in Figure 1.

Figure 2 is a cross-section of the single cylinder compressor, and both the cylinder and piston are manufactured of a close grain cast iron, the cylinder and piston ground to close limits. The eccentric shaft is of extra size and supported at each end by a bronze bearing. Oil holes and grooves are provided to insure proper lubrication at all times. Instead of the usual crank throw, the Zerozone shaft is one solid piece of steel, with the eccentric mounted on its center, and held by two Woodruff keys and a set screw locked on with a lock nut.

Referring to Figure 2, from the flywheel end, it will be noted that a coiled spring pushes against a collar, which in turn rests against a shoulder on the shaft. This shoulder, at the other end, rests against the eccentric hub, and the thrust of the spring is carried through it to the thrust washer at the other side, which rests against the crankcase or compressor base. The Zerozone

adopted this method of construction, which they claimed holds the eccentric in line, and the thrust is carried by the base and any wear is automatically taken up. The lower end of the connecting rod is large enough to fit over the outer rim of the cast iron eccentric, providing a bearing surface so large that no adjustment or take-up should be required during the life of the machine, and for this reason, the lower end of the connecting rod is made solid.

Compressor Design

As the connecting rod carries the wrist pin fitted between bosses on the inside of the piston, it therefore holds the connecting rod in alignment without the use of any special block or set screws. The wrist pin is fitted through the bosses of the piston, and held in position by a spring lock at each end. This lock consists of circle of spring wire which is placed in the piston at each end of the wrist pin, and allowed to expand in half round groove that is counterbored to receive it. This method is designed to protect the cylinder from being scored by loose wrist pins, and at the same time, to eliminate parts that may work loose and cause trouble. The discharge valve is the feather type. A

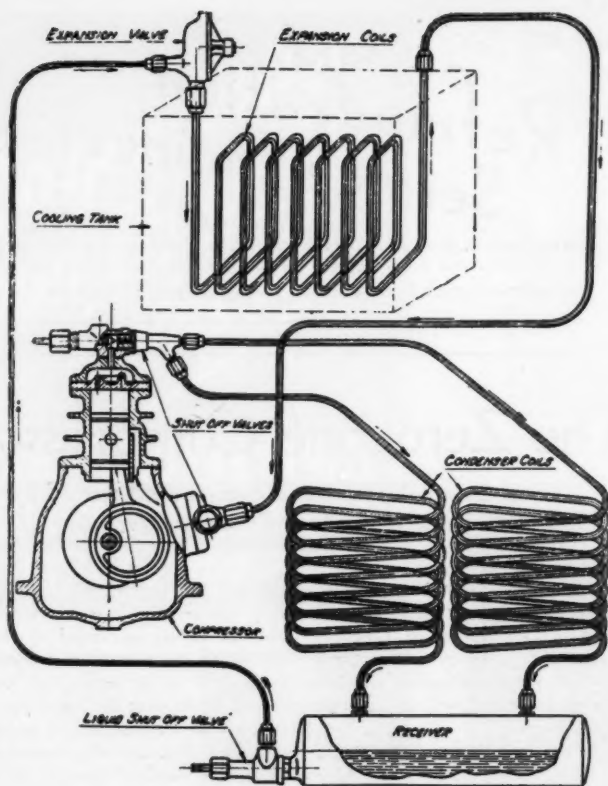


FIG. 1. ZEROZONE CYCLE OF OPERATION

further view of the cross-section of the Zerozone single-cylinder compressor is given in Figure 3.

The Receiver

The receiver is a seamless steel tubing tank suspended under the base of the compressor. Two inlets are provided on the top which connects to the lower end of the condensing coils mounted directly above on the base. The following charge of SO_2 are for the machines designed:

A single-cylinder (SC) compressor is charged with 3 lbs. of SO_2 .

A twin-cylinder (TC) is charged with 4 lbs. of SO_2 .

The B-49 compressor is charged with 1 lb. of SO_2 .

Expansion Valve

Figure 4 is cut-away section of the Zerozone expansion valve. Expansion valves are made with different sizes of orifice holes for twin and single cylinder compressor. The opening in the center of the expansion valve cover holds the coiled pressure spring, the inner end of which rests against a plate on the diaphragm. The outer end of the cover opening is threaded, and a slotted plug is screwed in compressing the spring which puts a pressure on the diaphragm, forcing it in toward the center of the main body. By changing the setting of the slotted plug, the tension on the spring can be adjusted, and thus the pressure on the diaphragm is regulated. The outside of the

B-1—51% length of belt, and diameter of flywheel is 15".

TC—58% length of belt, and diameter of flywheel is 15".

Shaft Seal

Figure 5 shows the Zerozone shaft seal,

Compressor—Reciprocating Type

Compressor Speed—880 R.P.M.

Evaporator—Cooling Tank filled with Non-Freeze Solution

Condenser—Air Cooled Forced Draft

Valve Control System—Dry System Expan-

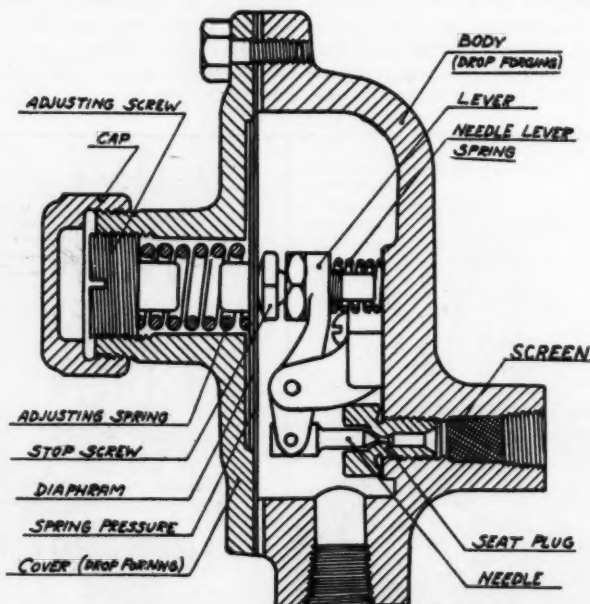


FIG. 4. CUTAWAY OF ZEROZONE EXPANSION VALVE

which consists of a sylphon fastened to the retainer plate, enclosing the spring, and its outer end is clamped on a gasket between the cover plate and compressor base. The possible point of leakage may be the surface between the shoulder of the shaft and the special thrust collar, but the spring is designed to keep a tension on the collar to automatically take up any wear.

Figure 6 is a view of the thermostatic control.

Model S-C Specifications

Motor— $\frac{1}{4}$ H.P. Single Cylinder
Motor Drive—"V" Belt
Motor Speed—1725 R.P.M.
Watts per Hour—250
Maximum Capacity—20 Cubic Feet
Equivalent in pounds of melting ice—130 lbs. in 24 hours

sion Valve, Cooling Tank—Thermostat Control

High Pressure—Governed by room temperature average 65 lbs.

Low Pressure—0 lbs.

Control Switch—Thermostat Mercury Tube Switch

Switch Operated—By Thermostat Sylphon and Mercury Tube

Switch Location—On Condensing Unit

Maximum Run of Tube Allowed—50 Feet
Unit Dimensions—19" deep; 25 $\frac{3}{4}$ " wide; 28 $\frac{3}{4}$ " high.

Model T-C Specifications

Motor— $\frac{1}{2}$ H.P. Two Cylinder
Motor Drive—"V" Belt
Motor Speed—1725 R.P.M.
Watts per Hour—360
Maximum Capacity—45 Cubic Feet

Equivalent in pounds of melting ice—232 lbs.
in 24 hours

Compressor—Reciprocating Type

Compressor Speed—300 R.P.M.

Evaporator—Cooling Tank filled with Non-Freeze Solution

Condenser—Air Cooled Forced Draft

Valve Control System—Dry System Expansion Valve, Cooling Tank—Thermostat Control

High Pressure—Governed by room temperature average 65 lbs.

Low Pressure—0 lbs.

Control Switch—Thermostat Mercury Tube Switch

Switch Operated—By Thermostat Syphon and Mercury Tube

Switch Location—On Condensing Unit

Maximum Run of Tube Allowed—50 Feet

Unit Dimensions—19" deep; 27 $\frac{3}{4}$ " wide; 25" high.

OTHER ZEROZONE COMMERCIAL SPECIFICATIONS

Model	AIR COOLED MODELS										WATER COOLED MODELS					
	1312	1416	2425	3333	3450	4375	44100	53150	54200		3333	3450	4375	44100	53150	54200
L.M.E. capacity per 24 hrs. 94	129	237	275	450	617	880	1284	1716			326	531	732	974	1466	1983
SPECIFICATIONS																
Compressor speed (r.p.m.)	340	400	400	255	380	285	370	280	390		275	420	300	390	310	425
No. of cylinders	1	1	1	2	2	2	2	2	2		2	2	2	2	2	2
Bore	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{3}{4}$		1 $\frac{3}{4}$	1 $\frac{3}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{3}{4}$	2 $\frac{3}{4}$
Stroke	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$		1 $\frac{3}{4}$	1 $\frac{3}{4}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$
Motor size	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2		$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	1	1 $\frac{1}{2}$	2
Refrigerant in system (lbs.)	2	2	2	4	6	6	8	8			2	4	6	6	8	8
Lubricant in system (lbs.)	1	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	4	4	8	8		1 $\frac{1}{2}$	1 $\frac{1}{2}$	4	4	4	8
Lubrication system	Splash										Refrigerant—Methyl chloride					

The Control of Refrigerants . . .

ARTICLE NO. 12 APPLICATION OF MAGNETIC LIQUID STOP VALVES

Two Types of Electrically Operated Valves Are Used to Automatically Control Refrigerants—the Magnetic or Solenoid Valve and the Motor Valve.

By J. L. SHRODE*

THERE are several general applications of the magnetic liquid valve and many special applications. This valve is used to maintain constant temperatures in all types of refrigerated rooms, coolers, counters, brine tanks, and the like. In general, a thermostat set at a predetermined temperature operates the magnetic liquid valve to maintain a constant temperature. Figure 1 is a typical installation of this kind. The magnetic stop valve is frequently used to regulate the flow of the refrigerant from some remote point. A switch located in a convenient place such as a central switch board or panel, is used to operate a magnetic valve installed in an inconveniently located liquid line. Such an arrangement is sometimes employed to eliminate the necessity of an

operator making the rounds of many coolers to open and close the liquid lines.

Figure 1 shows magnetic liquid stop valves installed on a water cooler and a room. An immersion type thermostat is located in the drinking water cooler and operates the magnetic valve to maintain a constant water temperature. This equipment also eliminates the possibility of the water cooler freezing. Another magnetic valve is located in the liquid line feeding the room coils and is operated by the room thermostat to maintain the desired room temperature. The magnetic liquid stop valve provides a positive means of controlling water coolers by employing the standard immersion thermostat.

In general, there are two possible ways in which a magnetic liquid valve might fail to

* President, Alco Valve Co.

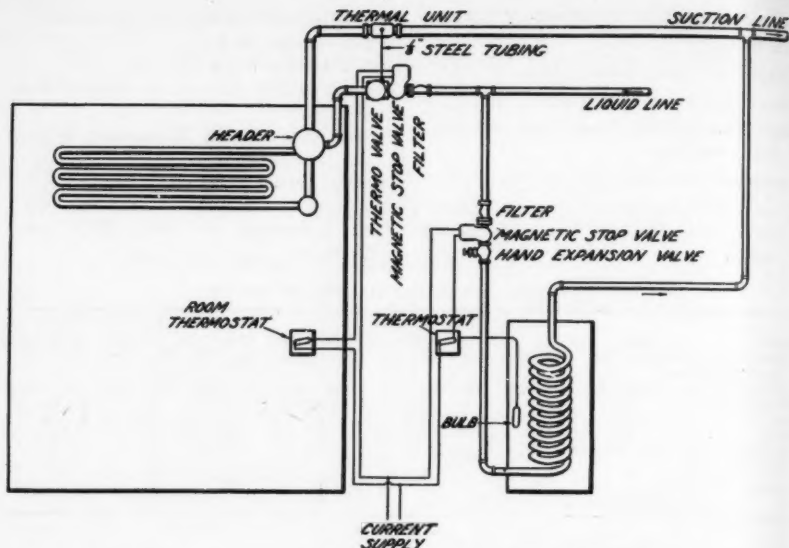


FIG. 1. MAGNETIC LIQUID STOP VALVE INSTALLATION

function properly; first, it may not close tightly due to a scored pin and seat and second, it may not operate at all due to a burned out coil.

If a magnetic valve leaks ammonia when it is closed, it does so because the pin and seat have been damaged by scale and dirt. It is important that dirt and foreign matter be kept out of the valve by installing a filter directly ahead of it. The system should be blown out before starting to eliminate as much of the dirt and scale, resulting from the installation work, as possible. It should never be blown out, however, with the magnetic valve in the line; a by-pass or dummy block should be used.

When a magnetic valve coil burns out it may usually be laid to one of the following causes:

Low or High Voltage—The usual magnetic valve will operate satisfactorily provided the voltage does not vary more than 10% above or below the rated voltage. Voltage in excess of 10% above normal will cause undue heating of the coil. Continuous over-voltage may eventually cause the coil to burn out. Low voltage will materially

reduce the pull of the magnet and if the voltage is low enough the coil will not have enough power to completely lift the plunger and the coil will heat up and eventually burn out. This will not take place if the line to the valve is properly fused.

If the fuse protector blows, locate the source of trouble but do not, under any circumstances, install larger protectors or fuses.

Tight Packing—Some designs of magnetic liquid valves require the use of a packing gland around the operating shaft. If the packing nut on this type of valve is too tight it will bind the shaft and the magnet will not have enough power to lift the plunger against this friction. If this condition persists the coil may burn out. The packing nut should never be tightened any tighter than is necessary to prevent leaking.

Excessive Frost and Moisture—The magnetic liquid valve should never be installed in cold rooms or moist places. It should never be installed in precooled refrigerant lines or places where frost is likely to accumulate on the valve. Moisture and frost on

(Continued on Page 26)

CHAPTER 2

The Second in a Series of Articles on Practical Accounting Methods for the Refrigeration Servicing Business.

Making Records Pay

First Have Good Records to Start With and Then Keep Them Up-to-Date. Accurate Records Do Not Mean a Long Record of Unimportant Details.

By J. B. COOK*

"HOW have you been getting on," said the business man to his young friend, the refrigerator service engineer. "Well," was the young man's reply, "I've got some mighty fine customers and I'm busy all day. When I get back to the office I try to write down the work I have done and keep up my correspondence and do my billing, but I find office work simply a nuisance."

"The reason, then, is that you haven't arranged your office well," replied his experienced business friend. If you are going to keep any records that are worthwhile; first have good records to start out with, and then keep them up-to-date. Avoid all the detail you can in your records. Don't write down any unnecessary detail, but be sure you do write down all the necessary detail. In other words, get good records and keep them briefly but completely.

This is the way to make records pay. In these days of aggressive business competition, you must be both a good workman and right up to date in your billings and your records. You must make them pay and they will pay if they are the right kind of records and you keep them as you should.

First and foremost will be the record of the work you do for each customer. How can you be sure that this record is complete and accurate. This is the way to do it. In your office you should have an order book. This may be elaborate or it may be perfectly

plain excepting that it is just like a journal or a copy book containing only the date and name of the Customer and the Order Number, and space to check it off when it is billed. This record can be kept in just an ordinary book but each line must be consecutively numbered so as to give a definite

order number to each assignment. Obviously, the reason for this is that you do not want to lose sight of any job. In other words, the number shown in your order book should have an order sheet bearing that same number and this should show that all your jobs are accounted for and billed when you have completed them and are ready to charge them to your customer.

The Order Book containing each numbered line is so simple that we shall not attempt to show any form here for that purpose, but the

Work Order blank, sometimes called a Job Ticket is extremely important and Figure 1 shows a good form for this purpose. Please notice, carefully, the following points: First the customer's name and address and you may want to make a notation there whether the work is to be paid for immediately, or whether that customer is entitled to credit. Of course, the simplest way is to collect for each job done, but you may have considerable business from certain customers, and then it is simply out of the question, and you must run the customer's account in your ledger. Therefore you must be sure that the customer's credit is good or else that you will collect very promptly as soon as you have done your work.

Send Your Questions

As this series of articles proceeds, you may want to ask some questions about your accounting methods—how to make them simpler or how to take care of your particular problem. Just address your questions to the author, J. B. Cook, c/o Refrigeration Service Engineer, 433 N. Waller Ave., Chicago.

*Jonathan Cook & Company, Certified Public Accountants, Chicago.

Zone H.H. Apt. Con. <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<h1 style="margin: 0;">WORK ORDER</h1>	Call No. _____
Name _____		Date _____
Address _____		
Time arrived: _____		Date Installed: _____
Comp. Model: _____	Cabinet Model: _____	_____
Serial Number: _____	Serial Number: _____	_____
Complaint: _____ _____ _____		
Work Done: _____ _____ _____ _____		
Labor Hrs. @ _____		<div style="border: 1px solid black; width: 20px; height: 40px; margin: 0 auto;"></div>
Travel Time @ _____		
Material Used: _____ _____ _____ _____		<div style="border: 1px solid black; width: 20px; height: 40px; margin: 0 auto;"></div>
Total Material		<div style="border: 1px solid black; width: 20px; height: 40px; margin: 0 auto;"></div>
Invoice No. _____	Total _____	_____
Charge _____	Policy _____	Gratis _____
Labor _____	_____	_____
Material _____	_____	_____
Customer _____	Service Man _____	
No. _____		
Call No. _____		Date _____
Received of _____		Dollars \$ _____
No. _____		
Signature _____		

FIG. 1. JOB TICKET FORM.

Your prospective customer has called you up and said he or she would like to have you come over and fix the refrigerator that is out of order. You go over there, look over the job and possibly you may be able to fix it on the spot, just by adjustment, or a very simple alteration; or you may find that part of the machinery will have to be taken out and some parts replaced. There may be a considerable amount of material that you will have to furnish.

Maybe you will have to send away for parts, and wait a few days or even weeks for the new parts. Temporary repairs for the refrigerator may be necessary while you are waiting for these parts. If the make is an old or discontinued line, you may have your troubles in replacing. But the important point for you as a business man is: Keep a record of your time, that includes your time going and coming as well as your time actually on the job. All this time, and

also the time spent in your shop on this job—all is chargeable time for this job. Many good service men have a "slight weakness" for giving away their most valuable commodity—time. They may not consider any time but that actually spent on the repair work itself, but that is simply shutting one's eyes to the truth. Such a man is really cheating—and he is his own victim. He is failing to account for an important part of his time.

He must not forget to include:

Labor Hours

Investigating Complaint

Travel Time (coming and going)

* Work done at the Shop

* Work at Customer's place

(* Including preliminary visit and temporary service, as well as actual repair time.)

In fact *all time* must be accounted for. (This will be the subject of a separate article later on.)

Materials used must be always recorded on the Work Order. It makes no difference whether it is material you happened to have on hand, or whether you had to order it especially for this job. You will, of course, carry some repair parts on hand. You paid the manufacturer for these parts long ago maybe and maybe they didn't cost much; possibly they are used parts—yet they all have chargeable value to your customer. One by one, in the aggregate, in a year's time—they would amount in value to a considerable part of your net profits. If you miss these miscellaneous little items you only cheat yourself—little by little—out of a big part of what you should earn. The average customer will pay your bill cheerfully—even though it seems high—if you can show definitely that the amount of labor and materials used warranted it. Your customer wants good service, and will pay a fair price—only it is your place to (be able to) prove to him that your price is fair.

Record all these materials used—against each customer's job—on the Work Order. Recording materials anywhere else helps you naught in billing. By all means see that all materials used are entered on your Work

Orders and billed to some customer's job. That is the place where the entry counts—on the Work Order—where it will be taken into consideration in making up your bill. (Entering materials used and making a proper profit on them will be discussed in a separate article later on.) "Many a mickle makes a muckle," goes the thrifty proverb.

The important points in this month's article are that you must have a "Work Order" (or Job Ticket) for each and every job. The safest way for the young hard working Service Engineer is to have an Order Book with each line consecutively numbered. And each and every job positively must be entered in it—no matter whether it is a cash or charge job—large or small.

Larger offices with elaborate accounting systems may have their Work Order sheets with printed consecutive numbers and may do without the Order Book, as such; but in some way they always guard most carefully each job so that it cannot be lost sight of, and must be billed as soon as the work is done.

§ § §

TRUPAR MFG. CO., SOLD

ON July 30, Dallas E. Winslow, president of Winslow-Baker-Meyering Corporation announced that his corporation had acquired the assets of the Trupar Manufacturing Company of Dayton, Ohio, manufacturers of Mayflower household and commercial refrigeration and air-conditioning equipment, from the trustee, E. P. Larsh. Trupar has been operating in trusteeship for several weeks past.

According to Mr. Winslow production of Mayflower household and commercial equipment was interrupted only one week, and shipments under the new management are again leaving the plant. Distribution of Trupar products will be continued through the channels established by the former Trupar management.

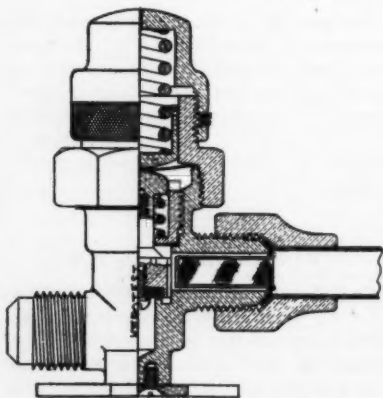
Other subsidiaries of Winslow-Baker-Meyering Corporation in the refrigeration field, include Copeland Refrigeration Corp., of Mt. Clemens, Michigan, Zerozone Refrigeration Corp., Chicago, Ill.

NEW MECHANICAL DEVICES Service Tools and Special Equipment

Under this heading there will be published illustrated descriptions of new or improved service tools and equipment for the Service Engineer.

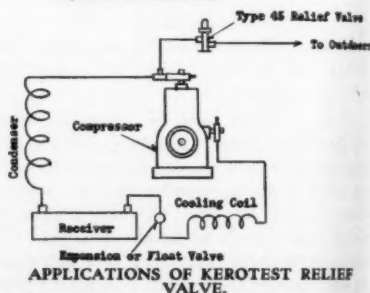
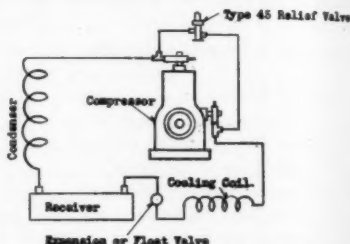
HIGH PRESSURE RELIEF VALVE

MAKERS of large and small refrigerators have since the beginning of the industry recognized the necessity of providing some means to relieve excessive high pressures in the refrigeration units either by high pressure cutouts or high pressure cylin-



KEROTEST RELIEF VALVE.

der heads. The high pressure cutout is generally used with electrically driven units, while the high pressure cylinder head is used on steam driven units. Either one of these protection schemes serves its purpose, but neither of them completely fills the demand for an all-round protection. The high pressure cutout disconnects the motor circuit when the pressure reaches the danger point and prevents damage to the motor and compressor, but if the pressure persists or even raises due to some other cause like fire, there is nothing to prevent the gases from escaping through some strained connections, sometimes causing stores and apartments to be filled with refrigeration gases.



Upper: Connections for relieving from high pressure side to low pressure side. Bottom: Connection for relieving to atmosphere.

Excessive high pressures may be due to several causes, as for instance overcharging, air in the system, insufficient ventilation, overload, or in case of fire. In most cases a temporary relief will bring the system back to normal and prevent damage to the motors, compressor and other parts of the system. In order to overcome these difficulties the Kerotest Manufacturing Company has developed a highly sensitive Relief Valve to keep the pressures within safe limits. When excessive pressure is reached, the valve opens with a snap action, usually at 200 lbs., and closes in the same manner when the pressure falls to 165 lbs. A fine mesh strainer prevents any particles of dirt from getting between the seats. The composition seat will not stick nor corrode after

prolonged service, thereby preventing any leak or unnecessary loss of refrigerant.

The Kerotest Type 45 Relief Valve may be used to relieve high side pressures to low side or can be used on the high side to relieve to the atmosphere. It can be used in conjunction with the Kerotest Fusible Safety Plugs to keep the pressure within safe limits until the Fusible Safety melts and relieves the whole system.

D. C. Butts
Oklahoma

I enclose check for \$3.00 for which kindly renew my subscription and send the binder.

Your magazine is one of the best service magazines that I have found on refrigeration. Keep the good work up.

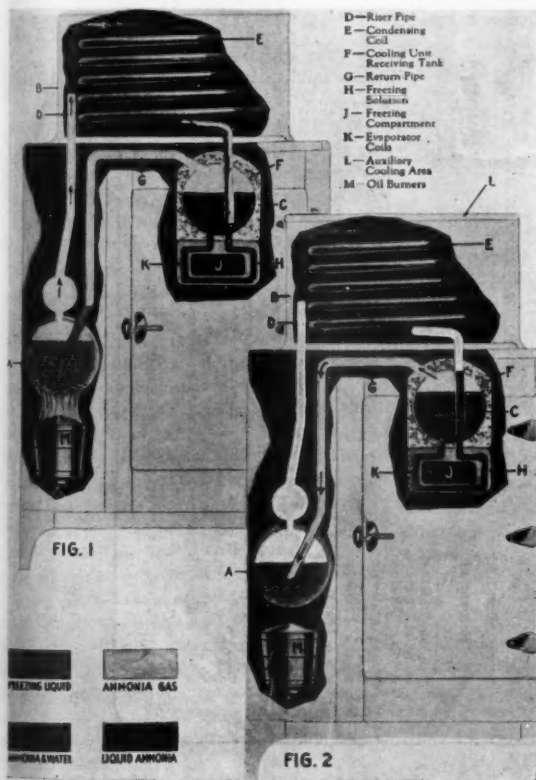
OIL-BURNING REFRIGERATOR

IN many localities where electric current is not available, and it is desirous of utilizing chemical refrigeration, fuel burning refrigerators are finding their market. The Perfection Stove Company of Cleveland, Ohio, manufacture the Superfex Oil-Burning Refrigerator, using ammonia as the refrigerant, and securing the necessary refrigerating effect by the heating of the ammonia through the utilization of Kerosene burners.

In the diagram reproduced herewith, the cycle of operation is graphically shown with the various component parts of the refrigerator designated. Ammonia vapor is driven through the condensing coil "E," which is immersed in the water tank "B," located at the top, and the liquid ammonia then continues to the cooling unit "E." The ammonia

in the freezing unit vaporizes and passes back to the generator slowly over a period of 24 hours. The patented Superfex liquid return plays an important part in the refrigeration cycle. Small amounts of water sometimes condense in the ammonia in the cooling unit, but are not carried back to the generator because the water will not evaporate in the low temperature inside the chamber. In this refrigerator, any surplus liquid left in the evaporator is always returned automatically to the generator 10 to 12 minutes before the burners have been lighted. The burners are usually lit once a day, and the fuel reservoir is filled with kerosene, and the amount to be placed in the burners is indicated on a gauge located inside the refrigerator.

(Continued on Page 26)



SUPERFEX OIL BURNING REFRIGERATOR.

CHART NO. 15 COMPRESSOR SIZE

REFRIGERATING EFFECT:—The available amount of refrigeration depends upon the latent heat of evaporation at the temperature and back pressure required and the sensible heat required to cool the liquid from the receiver temperature to the evaporating temperature.

COMPRESSOR CAPACITY TABLE:—In the following table is given the equivalent pounds ice melting effect per hour per 1000 cubic inches per minute piston displacement under three different back pressure applications of operation in evaporator, usually met with in practice.

APPLICATION "A":—Water Cooling and Air Conditioning

APPLICATION "B":—Food Storage

APPLICATION "C":—Ice Cream Storage

I. M. E. PER 1000 CU. IN. PER MINUTE ACTUAL PISTON DISPLACEMENT

Refrigerant	Application	Back Pressure Gauge	Saturation Temp. Fahr.	Lbs. Ice Melting Per Hr.	Condenser Cooling Medium F.
Sulphur Dioxide	A	6 lbs.	28°	6	86°
Sulphur Dioxide	B	6 ins.	5°	3	86°
Sulphur Dioxide	C	16 ins.	-15°	1.3	86°
Methyl Chloride	A	20 lbs.	29°	8	86°
Methyl Chloride	B	6 lbs.	5°	4.07	86°
Methyl Chloride	C	4 ins.	-16°	2.2	86°
Freon (F-12)	A	27 lbs.	28°	8.04	86°
Freon (F-12)	B	12 lbs.	5°	4.1	86°
Freon (F-12)	C	2 lbs.	-16°	2.2	86°

COMPRESSOR EFFICIENCY: The service engineer should not confound the term *piston displacement* with *gas displacement*. For instance, assume that the piston displaces a space of 1,000 cubic inches per minute, if the volumetric efficiency is about 75%, then only about 750 cubic inches of gas will be displaced on the suction side. However, after a small unit is in use, a short while, the volumetric efficiency may drop as low as 50%. Everything else being equal, the lower the efficiency, the lower the volumetric efficiency. Volumetric efficiency depends on the tightness of the valves and pistons in addition to care in design, the lower the volumetric efficiency. Volume-trip depends on an all-around efficiency of 50% and therefore will not correspond with manufacturer's ratings, who usually base their calculations on a 75% volumetric efficiency at standard back pressure and standard condenser pressure.

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Cut out along outer line and insert in binder for ready reference.

FOR LEATHER BINDER WRITE TO H. T. McDERMOTT, SECRETARY REFRIGERATION SERVICE ENGINEERS' SOCIETY
433 N. WALLER AVE., CHICAGO, ILL.

REFRIGERATION AT Chicago's Century of Progress

The Story of Refrigeration Advancement. Refrigeration
Used for a Multitude of Applications from Open Air Skating
Rink to Cigar Making and Planetarium Air Conditioning

THE Chicago Century of Progress should be by far one of the coolest locations accomplished by artificial means. The diversity of application for refrigeration in the many installations is a remarkable indication of the use of refrigeration in present day food preservation, as well as personal comfort.

Refrigeration at the Exposition this year has taken another big jump in the number of air conditioning installations in the various exhibit buildings. No matter what the temperature of "Old Sol" may be, an ideal climate can be found in any of the various expositions, buildings and concessions, many of which are without cost to the public. The Century of Progress will certainly make an indelible impression upon the visitor as to the comforts of air conditioning.

As regards the refrigeration equipment installed for the various concessions, restaurants, food exhibits and other like places, one independent service organization was responsible for nearly 350 such installations.

One of the unique refrigeration installations, which is an interesting public attraction, is the open air ice skating exhibition featured in the Black Forest Village. Irrespective whether the thermometer registers between 90° and 100°, the open air ice skating rink is always sufficiently supplied with ice for exhibition skating. The surroundings of the Village, with its ice and snow covered buildings, lend a realistic setting to the Village itself. A CO₂ Wittenmier installation provides the refrigeration for the rink as well as the air conditioning for the Village restaurants. The freezing of the ice on the skating rink is closely controlled by electrically actuated Alnor electric thermome-

ters, so that when the ice reaches a temperature of 28° the machine is automatically cut in. The control is sensitive to within 1/10th of 1° F.

Small Commercial Units

Large users of a number of small commercial machines include Swift & Co., with their various butcher work rooms in the restaurants cooled with Servel Humididrafts and the restaurants air conditioned by Carrier Engineering Corp.

Various display cases and counters on the Swift Bridge of Service maintain ideal conditions for the displaying of Swift's food products.

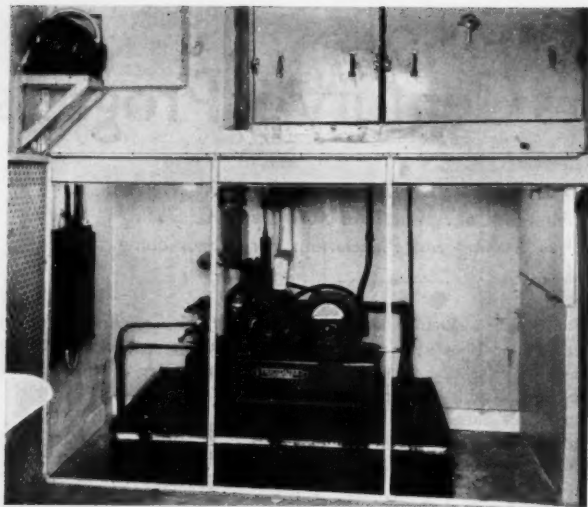
Hot dog, soft drink and other confectionery stands controlled by Wilson, Libby and Durke Food Products, and Swift among the larger packers, have individual installations of commercial units. Frigidaire and Servel compressors are mostly used in these stands.

Air Conditioning

Some 800 tons of refrigeration are employed at the Century of Progress for air conditioning work, not including the various modern passenger and pullman trains, refrigerated shops, etc. Some idea of the diversity of air conditioned apartments which have been installed may be secured from the following list of exhibits:

Air Conditioned House

A completely air conditioned house that will undoubtedly attract much interest from present and prospective home owners is presented by the Frigidaire Corp. in the sunken garden just north of the General Motors Building. The house is modern in architectural design and the purpose of the exhibit



CENTRAL PLANT
USED TO PROVIDE
CONDITIONED AIR
FOR THE FRIGIDAIRE
HOUSE AT THE CEN-
TURY OF PROGRESS.
COMPRESSOR BELOW,
COIL AND FAN
CHAMBER ABOVE.

is to offer visitors the opportunity to feel for themselves the possibilities of home air conditioning. The first floor of the home is air conditioned with a duct system operated from a central system in the basement. The upstairs rooms have units of various types to insure comfortable conditions to meet individual requirements of the occupants. The house is thoroughly insulated and has double-pane glass to prevent heat temperature loss during either the heating or the cooling season. The residence, as well as its furnishings, was designed to answer the needs of the average American family.

In designing the air conditioning system for the house, it was necessary to take into consideration the fact that extraordinary refrigeration capacity will be essential because of the large number of persons who will be in the house. Two air conditioning plants have been provided, one being the practical every day installation normally required for a home of this size and with normal occupancy, and one to provide the additional capacity to cool the large number of visitors. The normal installation consists of a standard 3 hp. unit for the central duct system and the self-contained units in the upstairs rooms. Sixteen and a half tons capacity is provided in the auxiliary plant made neces-

sary by the crowds. For the comfort of visitors, water coolers will be installed near the walk approaching the house entrance, and a cooler will be in operation within the home.

Westinghouse Exhibit

In the Electrical Building the Westinghouse Electric & Manufacturing Co. shows a representative list of its air conditioning units which fill the requirements of the smallest apartment to the largest commercial establishment. Those units are in operation. Also a new air conditioning and cooling unit has been installed in the Westinghouse Theatre which seats 150 people. This is designed to keep the air fresh at a temperature 10 degrees lower than the outside air. This equipment provides 180,000 cu. ft. conditioned air per hour. The exhibit office and reception room, also the model of the largest transformer, the inside of which was developed for a "black light" room, is air conditioned. Six room coolers are in operation. Self-contained and requiring no permanent connection, being portable and mounted on casters with various finishes, visitors may move them about, start and stop them, as they would in their own homes. Some of the equipment consists of cutaway

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sections showing the operating mechanism, filters, sprays, etc.

The Crane Co. has an exhibit in a separate building near the Thirty-first Street entrance similar to the one maintained last year. Here is shown a combination heating, cooling and dehumidifying unit designed to fit the needs of the average residence or small store.

In the north end of the General Exhibits Building, the Fairbanks Morse Co. has on display one of their Ortho-Clime air conditioning units, designed for homes, offices, stores and other smaller establishments.

The Hess Warming & Ventilating Co. which had a display at the 1893 Columbian Exposition as well as last year's Century of Progress, returns this year with an improved and segmented display. This company, sixty years old, has incorporated several new features in its space in the General Exhibits Building this year.

The Bettendorf Industries, comprising a group of affiliated companies, including The Westco Pump Corp. of Davenport, Iowa, and the Micro Corp. of Bettendorf, Iowa, are sponsoring an attractive exhibit in Home Planning Hall. Of particular interest from the standpoint of refrigeration is the display of Westco Turbine Pumps which are widely used in the refrigerating industry for circulating brine, ice water, etc. Also featured in this display of interest to those who are concerned with air conditioning is the hook-up of a New Bettendorf Automatic Oil

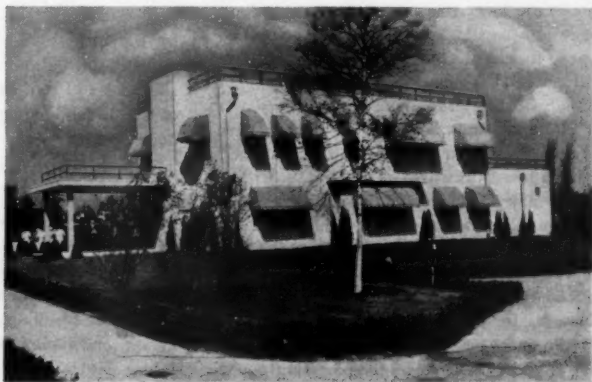
Burner with a Weir air conditioning furnace.

The Weil-McLain Co. has an exhibit in this building showing its oil burners and air conditioners.

The Century Electric Co. has an exhibit in the Electrical Building which illustrates the company's line of motors and other equipment. Of chief interest to those engaged in the refrigerating industry is the blower motor which was exhibited with the same equipment at the Heating and Ventilating Exhibit in New York City, February 5 to 9, 1934. This consists of a two-speed blower motor with control equipment, including an electric eye to change the speed from 900 to 1800 r.p.m. This motor is connected to a blower, the air from which is blown out through a cellophane stack arranged so that a toy balloon, suspended, stays at the bottom of the stack when the motor is running at 900 r.p.m. and at the top of the stack when the motor is operated at 1800 r.p.m. This arrangement demonstrates the quiet operation of the two-speed blower motor used and it is this desirable feature that is attractive to those who design, sell or install refrigerating unit in connection with air conditioning.

The Gar Wood Industries, Inc., has an exhibit in the General Exhibits Building which includes animated displays of Tempered-air conditioning and boiler burner units with a typical Gar Wood basement set up in the exhibit. The unit exhibit by this com-

EXTERIOR VIEW OF FRIGIDAIRE AIR CONDITIONED HOUSE AT CENTURY OF PROGRESS.



pany was designed to supply correct air conditions the year 'round. In the summer months comfortable conditions are maintained by correct air circulation with mechanical cooling and dehumidification equipment added when conditions require.

Kelvinator, in its exhibit of commercial refrigeration equipment in the Electrical Building, shows several room coolers and condensing units.

In the group of model houses located between the Twenty-sixth and Thirty-first Street entrances, a number of air conditioning installations are shown.

The Common Brick House, built to show the use of common brick in home construction, is equipped with a variety of Ilg air conditioning equipment. A floor type room cooler connected to a one hp. Ilg compressor is in the dining room, the same equipment is used for one of the upstairs rooms, also one Ilg spot cooler, Ilg fans in the kitchen and bathroom, and an Ilgattic system for circulating cool night air throughout the house.

The Stran-Steel Corp. steel house has an air conditioning unit installed by the Bettendorf Corp.

The Arnco-Ferro house has a combination heating and air conditioning outfit manufactured by the Surface Combustion Co., Toledo, Ohio.

The Masonite Corp. house has a gas heater made by the Bryant Heater & Manufacturing Co. with an air conditioner attached.

The house displayed by the National Lumber Manufacturers Association last year had a Holland furnace with air conditioning unit attached, but this year, because of the crowds necessitating many doors being kept open, it was decided to dispense with this equipment.

The Rostone, Inc., house is equipped with a Holland combination warm air oil burning furnace with an air ventilating system with a two-bank spray.

Century Homes is equipped with a Holland air conditioner in combination with Timken oil burner furnace equipped with a Universal 5-ton compressor.

The crystal house, shown by Modern Homes, Inc., in the rear of the Electrical Building, has a heating and forced air cooling system using gas. The heating system

was made by the American Foundry & Furnace Co., with refrigeration furnished by Reliance Refrigerating Co. equipment, powered by a Century motor.

Transportation Group

In the transportation group, the new Burlington streamlined, stainless steel, three-car Zephyr has received much publicity and doubtless will be one of the most-visited and best-examined exhibits. It is completely air conditioned. This train was not on exhibit when the Fair opened, but it was moved into the space reserved for it July 15.

Another air conditioned train that will draw much interest is one built by the Pullman Co. at a cost of \$200,000 for the Union Pacific Railway. The temperature in each of the three cars on this train are under constant control by thermostat. The air cooling system, with a refrigeration capacity equivalent to the production of $7\frac{1}{2}$ tons of ice in twenty-four hours, is an adaptation of the Pullman mechanical system to the special requirements of this train. A Freon compressor made by the General Refrigeration Co., Beloit, Wis., is driven by a direct connected Louis Allis 12 hp. d-c. motor. This power unit, together with the necessary air cooling equipment, is installed in the baggage room. The cold air is discharged in each of the cars from a central ceiling duct and exhausted through two floor ducts. A cooling thermostat is located on the side wall of the second car, controlling automatically the operation of the cooling compressor. The maintenance of satisfactory temperatures in this train is assisted by the insulation which consists of a 2-in. Rokflos insulation applied on the floors, side end and roof of the cars, together with cork tile and composition flooring on the floors.

Both of these trains have fixed windows and every bit of air breathed by passengers is washed, cleaned, cooled and given the proper humidity.

The Baltimore & Ohio train in the transportation group south of the Travel and Transport Building, shows a modern system of air conditioning with mechanical refrigeration. Each car of this train is a separate

unit with its own cooling and circulating system, independent of the rest of the train, all operating electrically from current supplied by generators and heavy duty storage batteries under the car. A booklet prepared for distribution at this exhibit describes the air conditioned feature. It explains that a new design $7\frac{1}{2}$ kw. third brush type generator, driven by a specially designed combination belt and gear drive from the axle of the car, is used. This generator furnishes power for operating the air conditioning equipment and at the same time furnishes additional current to a storage battery so that the air conditioning equipment can be operated whether the car is in motion or standing in the station. Freon is used as the refrigerant. The air cooling apparatus is controlled automatically by the temperature operated thermostat which can be set at a predetermined temperature.

In the center of the passage leading from the dome to the general exhibits in the Travel and Transport Building is the Pullman exhibit. This consists of an old day coach remodeled into the first sleeping car alongside of which are two modern aluminum sleeping cars, air-conditioned with Pullman equipment. This exhibit is practically the same as last year.

The Milwaukee Railroad has two exhibits in the Travel and Transport Building in one of which a new type ventilated coach is being featured.

The Chicago & North Western Railroad maintains two exhibits; one inside the Travel and Transport Building and the other just south of that building. No air conditioning features are shown in either of these exhibits, but literature is distributed, calling attention to the air-cooled equipment maintained on the club, lounge and dining cars on most of the crack trains to the West, North and Northwest.

Air Conditioning Service Uses

In addition to the exhibits, a large variety of service uses of air conditioning are utilized in addition to those already mentioned. It has not been possible to list all of these, but a brief description of a number of the representative installations are given below.

Three private offices at the Century of Progress are air conditioned. The office of Rufus Dawes, president of the Fair, is cooled by a 2-ton Westinghouse system, and the same system is used in the office of Major Lohr, general manager. Both of these are located in the Administration Building. The administrative office of the Streets of Paris is also cooled with an Ilg self-contained spot cooler of about one ton capacity.

The Union Carbide & Carbon Co. has an exhibit in the Hall of Science in which the space is air conditioned. A total of 41 tons of refrigeration is furnished by equipment installed by the Kroeschell Engineering Co. of Chicago.

General Electric Exhibit

The General Electric's House of Magic, seating 300 people, which attracted capacity crowds last year, is air conditioned with the General Electric indirect cooling system installed last year. It includes ten 3 hp. General Electric Freon condensing units, each connected to a Model M-150-R filtrine water cooling tank from which cold water is pumped to cooling units serving conditioned air. In the products display exhibits General Electric features its year 'round equipment, including room coolers, winter humidifiers, gas and oil furnaces, and year 'round systems.

The large lobby of the General Motors Building is cooled by a central air washer system using 100 tons of Wittenmeier refrigeration. This system was installed in the spring of last year, before Frigidaire's heavy duty air conditioned compressors were available. Conditioned air is introduced through twelve grilles located along two side walls. Return air ducts are sealed above the lighting fixtures. It is interesting to note that the General Motors Theatre, seating 235 people, which was air conditioned shortly afterward, employed the first three of Frigidaire's 10-ton compressors to come off the production line in Dayton. Two dressing rooms and the foyer are cooled by ducts and also by Frigidaire floor type cabinets recessed in the walls.

Theatre Cooling

The Ford Theatre, in the Ford Building, is air conditioned by York equipment installed by Westerlin & Campbell of Chicago. This installation uses a York 32-ton compressor driven by a 40 hp. motor with Freon refrigerant in direct expansion to copper tube and aluminum fin York coils in a central station system with automatic control.

The Kelvinator exhibit includes a 150-seat theatre cooled by two of Kelvinator's largest suspended type cooling units served by a 15 hp. Kelvinator compressor installed in the commercial exhibit space. Directly across the aisle from the Kelvinator exhibit is Leonard's 95 seat theatre in which sound movies are shown. This theatre is conditioned by a 10 hp. Kelvinator machine connected to two suspended type cooling units.

Another air conditioned theatre is located in the electrical industry exhibit in the Electrical Building. A number of power companies are sponsoring this exhibit to tell the public utility story. The theatre contains 200 seats and is cooled by Frigidaire air conditioning equipment with a capacity of 18 tons of refrigeration.

The 150 seat theatre in the Westinghouse exhibit in the Electrical Building is conditioned by one of the new Westinghouse 6 cylinder, 12-ton refrigerating machines operating with two 6-ton overhead type cooling units.

The small theatre operated by the Household Finance Corp. in the Hall of Social Science is air conditioned by a 2½ ton Ilg condensing unit serving two ceiling type units which project cooled air through ducts at the ceiling.

The State of Florida, which had one of the outstanding exhibits in the Hall of States last year, is placing what was its outdoor garden last year under glass. Both the main hall and this new conservatory will be air conditioned and cooled, using York equipment.

Two restaurants in the Old English Village are air conditioned with equipment installed by the Midwest Engineering Co., employing three 15 hp. Frick universal condensing units producing 38 tons of refrigeration

per day in direct expansion Trane cooling coils.

Old Heidelberg Inn is using the same 20-ton air conditioning system as used last year. The compressor is a Vilter rotary operating with Freon.

The Triangle Restaurant in the Hall of Science is equipped with a 75-ton York air conditioner for providing comfort cooling. It was installed by Westerlin & Campbell Co. This is a Freon system and circulates 30,000 cu. ft. of air per minute.

The new Armour building has a display booth in which chipped beef is made by girls working behind a display window. This is cooled by a York basement type air conditioner with compressor, motor, controls, cooling coils, all mounted in one cabinet. This system has a rating of four tons of refrigeration and uses Freon.

The bacon slicing exhibit room of the Wilson & Co. display in the Foods Building is air conditioned with a temperature of 55° F. and relative humidity of 70 per cent maintained. The bulkheads around this room are formed into a circular compartment which is used as a holding cooler for the bacon slabs, also for the finished packed product. This space is maintained at a temperature of 28° F. with brine coils.

Mrs. Snyder's Candy Shop on the Twenty-third Street bridge, has installed a 3-ton Ilg system.

The Time-Fortune Pavilion is cooled by a 30 hp. York Freon condensing unit serving a number of York floor type air conditioners and a system of ducts designed to harmonize with the interior decorations.

The Florist Shop in the Electrical Building is cooled by a new Kelvinator self-contained room cooler.

The General Cigar Co. exhibit, which includes a small building on the Twenty-third Street plaza with a small cigar manufacturing unit is cooled with 12 tons of Wittenmeier refrigeration.

The Kraft Cheese exhibit in the Foods Building is air conditioned with an Ilg cooling system employing two Ilg compressors totaling five tons of refrigeration, connected to two ceiling type room coolers and a self-contained Ilg cooler in the dressing room.

The Mallinckrodt Chemical Co. exhibit in the Hall of Science is cooled with 10 tons of Frigidaire cooling equipment.

The Singer Sewing Machine Co. display

in the Electrical Building is cooled with a 15-ton refrigerating machine made and installed by the Carrier Engineering Corp. and was used last year.

ELECTROLUX THERMOSTAT

A NEW thermostat will be used on all air cooled Electrolux refrigerators except the APT-EE-80, 40 and 50 models which will be equipped with the new No. 10 thermostat.

Function

1. Controls flow of gas to burner, between limits of maximum and minimum heat input adjustments.
2. Regulates minimum gas input.
3. Housing provides for burner lighter assembly.
4. Controls refrigeration temperatures.
5. Is used for defrosting when temperature control knob pointer is adjusted to "defrost" position.

Adjustments

The Nos. 9 and 10 type gas thermostats are shipped from the factory with the Temperature Control Adjusting Knob Pointer set at No. 3 position and adjusted for a control point of approximately 12 degrees F. bulb temperature with the pointer in this position. Dial sensitivity of the Nos. 9 and 10 thermostats is approximately 6 degrees F. per division.

Should it become necessary to change factory adjustment proceed as follows:

1. Observe existing temperature on bottom shelf of freezing compartment.
2. Set lower temperature control drum at position where thermostat controls flame (Control Point). This will be found by rotating drum from Defrost position towards No. 1 position if maximum and minimum flames are adjusted.
3. Remove lower temperature control drum from thermostat by removing retaining screw in center of drum.
4. Determine correct position for lower temperature control drum pointer using the 6° F. per division rule and knowing that No. 3 position on thermostat should give approximately 12° F. setting.

5. Replace lower temperature control drum with pointer in correct position and turn to No. 3 setting.

Burner Lighter

Regulate burner lighter flame approximately 2" in length by adjusting screw directly above Burner Lighter Push Button.

Minimum Flame

It is essential that the by-pass flame be properly adjusted so that the refrigerator will defrost when the temperature control knob pointer is turned to "defrost" position. If the by-pass flame is too large, the refrigerator will not defrost when pointer indicates "defrost." If the by-pass flame is too small, the flame will be extinguished by the automatic shut-off safety device when the pointer is on "defrost," making it necessary to re-light the burner when the defrosting is completed.

Adjustment of Minimum Flame

1. Adjust temperature control knob pointer to "Defrost."
2. Remove by-pass seal screw.
3. Regulate flow of gas by adjusting by-pass adjusting screw.

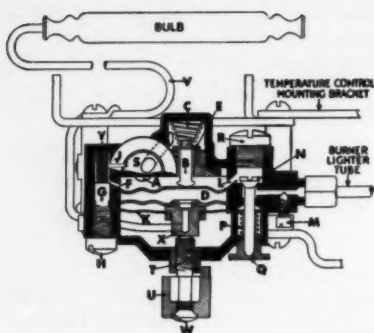
Minimum by-pass flame should be approximately one-fourth as large as maximum flame.

Test for Operation

When the thermostat bulb temperature is below 28° F., the thermostat may be tested for sensitivity.

1. With the thermostat on minimum flame, turn temperature control pointer in the direction of No. 1 position until the minimum flame starts to increase (control point). Then turn one-half division towards defrost position.
2. Warm thermostat bulb with hand or warm cloth and note change in flame size from minimum to maximum.

Failure of flame to increase indicates inoperative thermostat.



ELECTROLUX THERMOSTAT

Assembly

- A—Gas Inlet
- B—Maximum Flow Valve Stem
- C—Maximum Flow Valve Spring
- D—Thermostat Diaphragm
- E—Maximum Flow Valve
- F—By-pass Inlet
- G—By-pass Adjusting Screw
- H—By-pass Seal Screw
- J—By-pass Outlet
- K—Sealing Diaphragm
- L—Burner Lighter Inlet
- M—Burner Lighter Adjusting Screw
- N—Burner Lighter Valve
- P—Burner Lighter Valve Spring
- Q—Burner Lighter Push Button
- R—Burner Lighter Seal Screw
- S—Gas Outlet
- T—Thermostat Adjusting Screw
- U—Thermostat Adjusting Screw Knob
- V—Capillary Tubing
- W—Thermostat Adjusting Screw Knob Retaining Screw
- X—Thermostat Diaphragm and Bulb Assembly
- Y—By-pass Adjusting Screw Spring

Operation

1. Gas enters thermostat through Inlet "A" filling diaphragm chamber area enclosed by Sealing Diaphragm "K."
2. The Thermostat Bulb is connected to the Thermostat Diaphragm "D" by Capillary Tubing "V." The Bulb is filled with a volatile liquid which exerts a pressure in the Diaphragm "D" corresponding to the temperature of the Bulb.
A change in pressure causes the diaphragm face to flex and the movement is transmitted to the Maximum Flow Valve "E" by means of the Maximum Flow Valve Stem "B."
3. The Valve "E" is open allowing gas to pass when the temperature of the Bulb is such as to exert a pressure on the Diaphragm face sufficient to cause the

Valve Stem "B" to open Valve "E" against the Pressure of Maximum Flow Valve Spring "C."

4. When the temperature of the Bulb is such that the pressure in the Diaphragm is reduced, the diaphragm contracts and the Valve "E" is closed by the Pressure of Maximum Flow Valve Spring "C." The only passage of gas to the burner is then through the By-pass Inlet "F" and By-pass Outlet "J." The By-pass Adjusting Screw "G" is used to adjust the "Minimum Flame."
5. When Valve "E" is open, gas passes through Gas Outlet "S" to the burner.
6. Gas passes through Burner Lighter Passage "L" to Burner Lighter Valve "N." When pressure is applied to Burner Lighter Push Button "Q," gas passes through Passage to Burner Lighter Adjusting Screw "M" and Burner Lighter Tube.
7. The Thermostat Adjusting Screw Knob "U" is fastened to the Thermostat Adjusting Screw "T" by Retaining Screw "W." The thermostat adjusting screw is always in direct contact with the Thermostat Diaphragm and Bulb Assembly "X." Motion of the Adjusting Screw "T" is directly transmitted to Valve "E" through Diaphragm "D" and Valve Stem "B" to change the operating temperature of the thermostat.
8. The Dial Face of the thermostat body housing is graduated into divisions for the purpose of making temperature adjustments.

§ § §

W. K. Hamilton
New York

Inclosed is check for \$2.00 for renewal of our subscription to the Refrigeration Service Engineer.

We consider this publication a big help to us in our business and would only say that we wish you would devote a little space each month to a different domestic refrigerator such as you have in some issues in the past. We find that in our service work it helps a lot to know a few things about some of the machines that are hard to get service information on.

The REFRIGERATION SERVICE ENGINEER

A Monthly Illustrated Journal, Devoted to the Interests of the Engineer Servicing Refrigeration Units, Oil Burners and other Household Equipment.

Vol. 2 August, 1934 No. 8

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REFRIGERATION SERVICE ENGINEERS' SOCIETY

RECORDS

"MAKING Records Pay" is the title of a series of articles now appearing in THE REFRIGERATION SERVICE ENGINEER, the second of which appears in this issue. The author, a certified public accountant, has had many years of experience in devising accounting methods for various businesses. In this series of articles he will explain the proper records to adopt for a refrigeration servicing business, and the ease with which these records can be kept provided a system is designed in the proper way.

It is surprising to learn, from a recent survey, the number of companies who are maintaining records in a haphazardous way, or are ignoring the various transactions which enter into the selling price of a commodity. A service business without records, no matter how small, may be likened to "a ship without a rudder," and is heading for dangerous ground.

One of the greatest faults, undoubtedly, is that the keeping of records, especially for a small service organization, may seem a burdensome detail, because the present system requires a record of so many unnecessary details. Simplify the records and have the accounts in a methodical manner and such an

arrangement will be conducive to keeping proper accounts.

Readers of THE REFRIGERATION SERVICE ENGINEER are invited to send any problem they may have regarding records for a service business.

FIRST R.S.E.S. CONVENTION

THE REFRIGERATION SERVICE ENGINEERS' SOCIETY, through its Board of Directors, announces the holding of its first annual convention in Chicago, October 11, 12 and 13. Chicago was selected as the first convention city, so that service men who are planning to attend Chicago's Century of Progress could arrange their trip to the fair at the time of the holding of this meeting.

This is the first national meeting ever held in the interests of refrigeration service men and the entire program will be arranged for the presentation and discussion of educational lectures and other matters of importance to all service engineers. In addition, the convention will transact such other business in the furtherance of the purposes and objects for which the Society is founded.

The convention will emphasize the importance of the rapidly expanding profession of refrigeration servicing as it applies to domestic refrigerators and small commercial units, and this first national meeting will represent a definite step forward in co-ordinating the efforts of the entire servicing profession for the mutual benefit of all, and to encourage ethical standards of practice.

"OFF-SEASON"

GENERALLY at this time of the year service organizations consider the possibility of securing servicing work on other household equipment to compensate for the "off-season" refrigeration months. This additional service business will help to maintain the operating personnel intact during the winter months.

From an operating standpoint where a service company may employ two or three men, the method of employing new men each

year is not always the most satisfactory. Refrigeration servicing is making consumer contacts every day and should benefit by these contacts for an all season business.

From the standpoint of seasonal demands, heating and refrigeration are closely allied and appear to be the logical all-year business. It, therefore, would seem that the refrigeration service companies who are desirous of taking care of the normal fall-off of refrigeration business should consider the possibilities that oil burner servicing offers. A number of accessories which enter into oil burner servicing, such as automatic controls, motors, etc., are well known to refrigeration service men and the matter of acquiring a knowledge of the balance of the equipment should be no difficult task.

REFRIGERANT CONTROL

(Continued from Page 10)

the valve may soon penetrate the magnet coil and cause a short circuit which will result in a burned out coil. Moisture will also cause the contact points of the pilot switch to corrode and may in time make this switch inoperable. An accumulation of frost on the lever arm in the case of the valve illustrated may cause it to bind and may block its movement. This would prevent the plunger from moving far enough up into the solenoid and would eventually cause the coil to burn out.

Noisy Magnet—Magnetic valves occasionally become noisy and emit a humming sound whenever the current is on. This is generally caused by a misalignment of the plunger or the solenoid frame. During shipment or installation these parts may have shifted a little out of place. To eliminate this noise it is merely necessary to loosen the solenoid frame while the magnet is energized, shift it to a quiet position, and tighten it in that position. If this does not eliminate the noise, the position of the plunger may be shifted slightly by changing the position of the lever on the operating shaft.

If there are any questions regarding the refrigeration appliances described in this series of articles, readers are invited to address their inquiries to the Editor.

OIL BURNING REFRIGERATOR

(Continued from Page 15)

The burners go out automatically at the end of the generating period from $1\frac{1}{2}$ to $2\frac{1}{2}$ hours, and the refrigerant automatically keeps the food compartment at the proper temperature for 24 hours without further attention.

This refrigerator can also be converted to use, either natural, manufactured or bottled gas. In this method, the automatic shut-off valve controls the amount of gas consumed at each heating. The dial is set for the time shown on the indicator, and the burner is automatically shut off at the proper time.

H. G. KOELLNER, DECEASED

THE death of Henry G. Koellner, owner and operator of the Koellner Ice Machine Co., 2408 Warren Ave., Chicago, occurred at his residence, 2747 N. Fairfield Ave., Thursday, July 12. Mr. Koellner was forty-eight years old. He had been in the refrigerating business for twenty-five years, about twenty years at the head of his own business, and for about five years previously with the United Refrigeration & Ice Machine Co. at Kenosha, Wis. He was a thirty-second degree Mason. Masonic funeral services were held Monday, July 16, at the Schatz Chapel, 2752 Diversey Ave., with interment at Waldheim Cemetery. He leaves a widow, Mrs. Anna Koellner, and a daughter, Helen.

F. A. Bailey, Jr.
South Carolina

It is with pleasure I hand you my check for \$2.00 for renewal of my subscription. Your magazine has been of great interest and furnished a lot of information during the past year.

Mel Sexton
North Dakota

I have been doing refrigeration service work for the past eight years and I always find something new and of interest, which is indeed helpful, in *THE REFRIGERATION SERVICE ENGINEER*.

H. G. Sweet
Missouri

I have every issue since the first of *THE REFRIGERATION SERVICE ENGINEER* and I value them highly.

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.



THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; with special reference to servicing and installation of domestic and small commercial equipment; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

ASSOCIATION HEADQUARTERS: 433-435 North Waller Ave., CHICAGO, ILL.

Program for First Annual Convention Being Planned

"MAKE Plans Now" is the watchword of the service man. All signs point to Chicago—the city of the First Annual Convention of the Refrigeration Service Engineers' Society, Thursday, Friday and Saturday, October 11, 12 and 13.

Just two months, but time to make definite plans to "combine business with pleasure" by attending this educational meeting and visiting the renowned Century of Progress.

This convention will be the first national gathering of engineers engaged in servicing work as it applies to the servicing of domestic refrigerators and small commercial equipment, and will represent an important step in the advancement and subsequent recognition of this rapidly growing profession.

Program details and other material will be released regularly, and in the meantime, make your plans to attend the Chicago Convention.



Scenes in the Various Villages at the Century of Progress. The Street of Villages Transports You Back to Scenes of Old Country Settings.

EDUCATIONAL MATERIAL FOR R.S.E.S. MEMBERS RELEASED

MR. GEORGE H. CLARK, chairman of the National Educational and Examining Board, has announced the release of the first in a series of educational lectures for the members of the Refrigeration Service Engineers' Society. This material is prepared and issued under the jurisdiction of this committee. The release of the first bulletin, which is titled a "Lecture Course on the Design, Operation and Servicing of Domestic and Small Commercial Refrigerating Units," is now in the printer's hands and will be sent to every member within the next few weeks.

Program Planned

The committee has planned a program of regular releases of educational material and


will treat the subject of refrigeration servicing from a semi-technical as well as from a practical standpoint. The educational releases will represent an important compilation and contribution to literature on the servicing of domestic and small commercial refrigerating units. There will be practical information published which has not appeared in print elsewhere.

Each release is issued as a lecture, completely illustrated, and contains a list of questions pertaining to the lecture. This enables the reader to examine himself as to the content of the lecture. These lectures will probably be released in twenty-four installments, each lecture being numbered consecutively.

Members of the Society are requested to notify the National Secretary if their lectures are not received promptly.

W. F. Turner
New York

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THE Question BOX

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box" which will be answered by competent authorities.

THE following question is answered by Mr. Harry D. Busby, Chicago, member Board of Directors, R. S. E. S.

Question 51. What is the advantage of replacing a K7 Servel low side float with thermostatic expansion valve?

Is it advisable to remove the complete float chamber or just remove the float and needle assembly?

What would the proper "hook-up" be on a K7 Servel using a Detroit Lubricator thermo expansion valve No. 670?

ANSWER. There is no advantage in the change over suggested except the possibility of overcoming oil binding.

If the expansion valve is installed it is advisable to remove the entire float chamber in order to avoid oil becoming trapped in either the coil or float chamber.

On the K7 evaporator the last two or three coils of tubing are a part of the suction line and are designed to take care of any frosting or overflow from the float chamber. When installing an expansion valve, this section should be coupled to the main part of the evaporator so as to make a continuous coil and the expansion valve installed as on any standard type of direct expansion coil.

It must be remembered that in removing the float chamber considerable chilling surface is being removed from the evaporator and there is the possibility of not having sufficient area to take care of the box. I would suggest that fins having the same total area of the float chamber be added to the coil.

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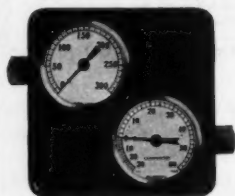
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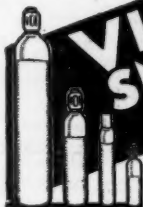
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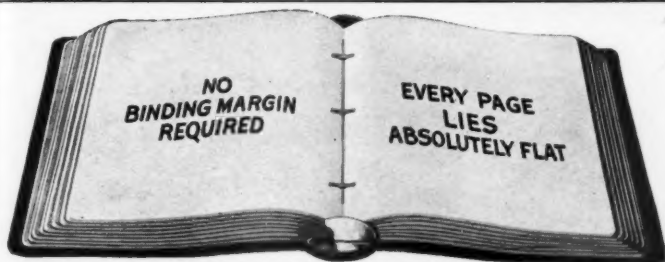
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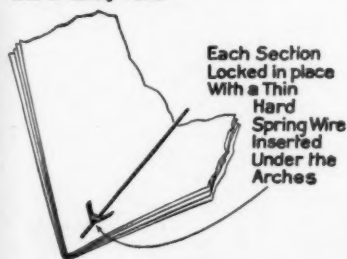
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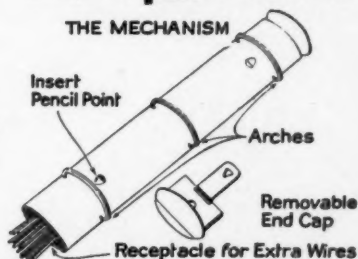
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